Tsukuba International Conference on Memory

Memory and Society

March, 8 - 10, 2002

Epochal Tsukuba
International Congress Center
Tsukuba, Japan

Organizers: Nobuo Ohta (University of Tsukuba)
　　　　　　Lars-Göran Nilsson(Stockholm University)

3rd
Tsukuba International Conference on Memory

Memory and Society

March 8, Friday

Douglas Herrmann (Indiana State University, U.S.A.)

Kathy Pezdek (Claremont Graduate University, U.S.A.)

Yukio Itsukushima (Nihon University, Japan)

Jonathan Schooler (University of Pittsburgh, U.S.A.)

Martin Conway (University of Durham, U.K.)

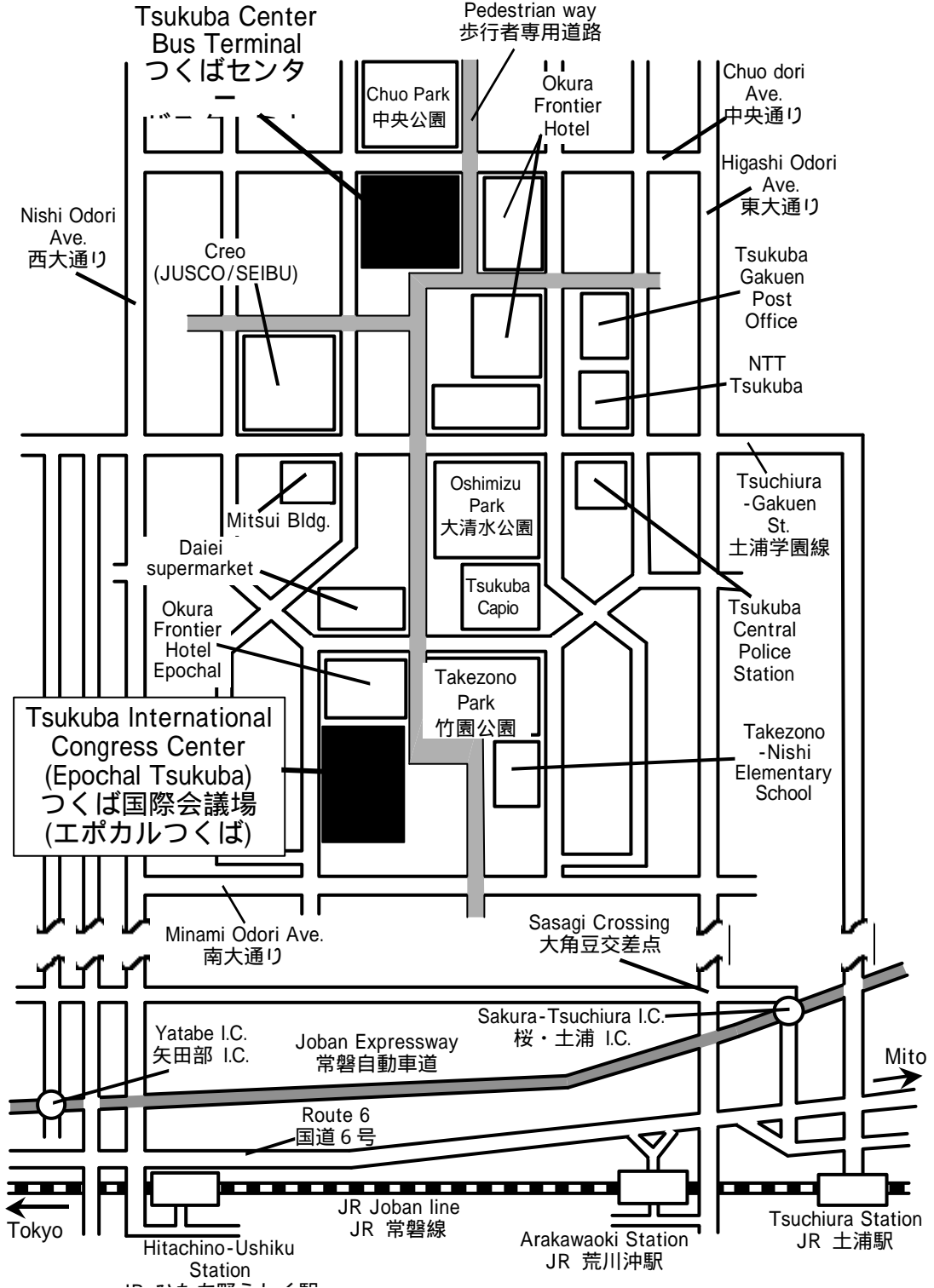D. Stephen Lindsay (University of Victoria, Canada)

March 9, Saturday

Elizabeth L. Bjork (University of California, Los Angeles, U.S.A.)

Fergus I. M Craik
   (The Rotman Research Institute of Baycrest Centre for Geriatric Care, Canada)

Dietrich Albert (University of Graz, Austria and Hiroshima University, Japan)

Robert A. Bjork (University of California, Los Angeles, U.S.A.)

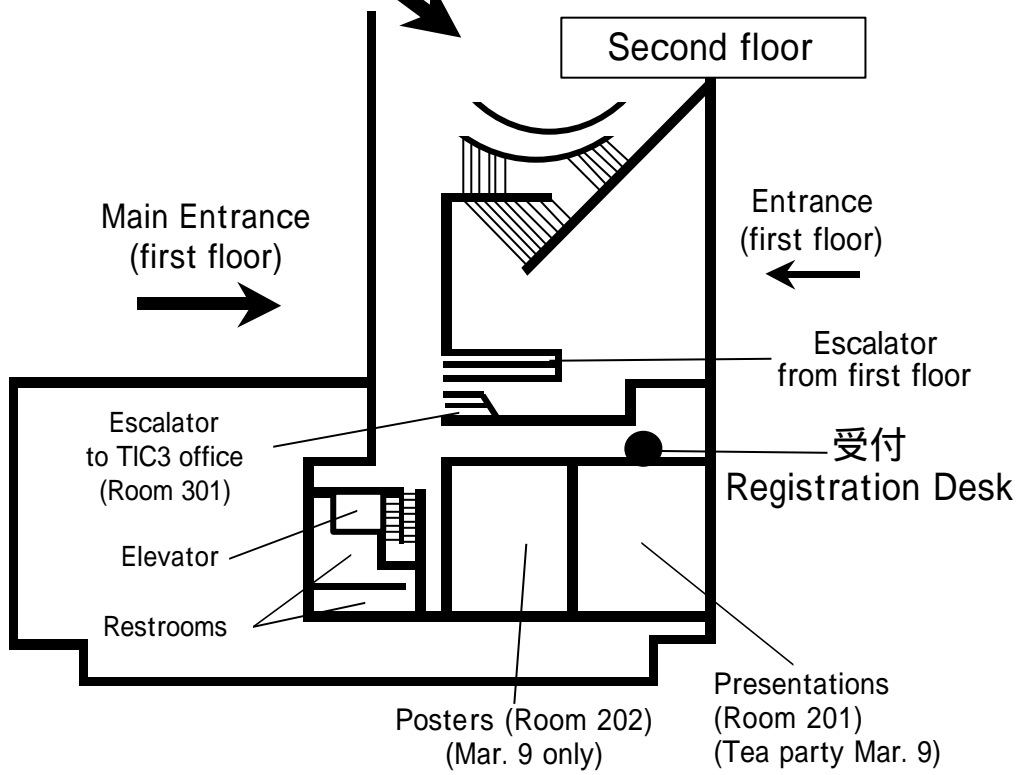Poster session
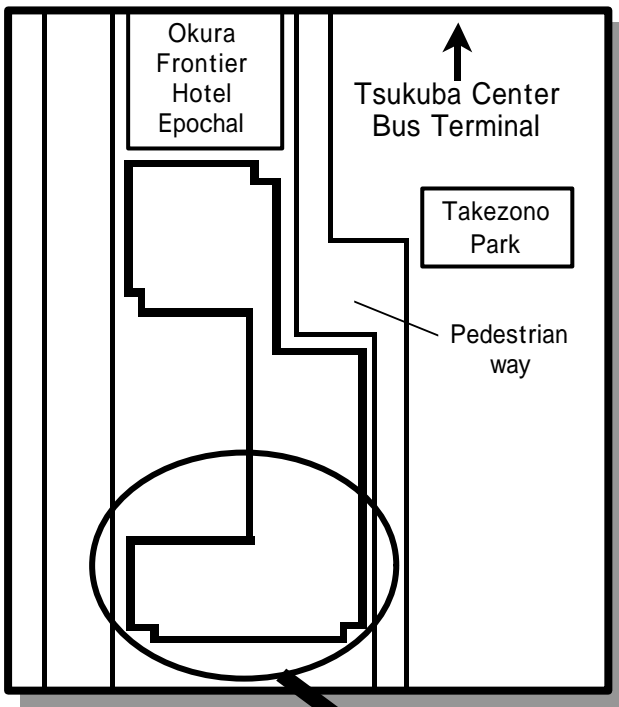
March 10, Sunday

Masaru Mimura (Showa University, Japan)

Barbara A Wilson
   (MRC-CBU, Cambridge and The Oliver Zangwill Centre, Ely, U.K.)

Ingvar Lundberg (Göteborg University, Sweden)

Robert H. Logie (University of Aberdeen, U. K.)

Location

It is about a 10-minute walk to the Epochal Congress Center
from the Tsukuba Center bus terminal

Tsukuba Center
Bus Terminal

Pedestrian way

Chuo Park

Okura Frontier Hotel

Chuo dori Ave.

Higashi Odori Ave.

Nishi Odori Ave.

Creo (JUSCO/SEIBU)

Tsukuba Gakuen Post Office

NTT Tsukuba

Tsuchiura - Gakuen St.

Oshimizu Park

Mitsui Bldg.

Daiei supermarket

Tsukuba Capio

Tsukuba Central Police Station

Okura Frontier Hotel Epochal

Takezono Park

Takezono - Nishi Elementary School

Tsukuba International Congress Center
(Epochal Tsukuba)

(   )

Minami Odori Ave.

Sasagi Crossing

Yatabe I.C. I.C.

Joban Expressway

Sakura- Tsuchiura I.C. I.C.

Mito

Route 6

Tokyo

JR Joban line JR

Hitachino- Ushiku Station

Arakawaoki Station JR

Tsuchiura Station JR

Conference Venue

Okura Frontier Hotel Epochal

Tsukuba Center Bus Terminal

Takezono Park

Pedestrian way

Second floor

Main Entrance (first floor)

Entrance (first floor)

Escalator from first floor

Escalator to TIC3 office (Room 301)

Registration Desk

Elevator

Restrooms

Posters (Room 202) (Mar. 9 only)

Presentations (Room 201) (Tea party Mar. 9)

3rd Tsukuba International Conference on Memory

Friday March 8

Chairpersons:
Masanobu Takahashi   (University of the Sacred Heart, Japan)
Osamu Ishihara   (Tokyo Metropolitan Institute of Gerontology, Japan)

09:30 - 10:00	Registration	
10:00 - 10:20	Opening	**Nobuo Ohta** (University of Tsukuba)
10:20 - 11:20	Speaker 1	**Douglas Herrmann** (Indiana State University, U.S.A.) Accuracy of reports of memory failures and of their causes
11:20 - 12:20	Speaker 2	**Kathy Pezdek** (Claremont Graduate University, U.S.A.) Memory for the terrorists' attack on New York, 9/11/01
12:20 - 13:40	Lunch	
13:40 - 14:30	Speaker 3	**Yukio Itsukushima** (Nihon University, Japan) Response conformity formation in face recognition memory
14:30 - 15:30	Speaker 4	**Jonathan Schooler** (University of Pittsburgh, U.S.A.) Discovering memories in the light of meta- awareness
15:30 - 15:50	Refreshments	

15:50 - 16:50	Speaker 5	**Martin Conway** (University of Durham, U.K.) The self-memory system: Autobiographical memory and identity
16:50 - 17:50	Speaker 6	**D. Stephen Lindsay** (University of Victoria, Canada) Adults' recollections of long-past events

3rd Tsukuba International Conference on Memory

Saturday March 9

Chairpersons:
Toshiaki Mori   (Hiroshima University, Japan)
Jun Kawaguchi   (Nagoya University, Japan)

Time		
09:00 - 09:20	Registration	
09:20 - 10:20	Speaker 7	**Elizabeth L. Bjork** (University of California, Los Angeles, U.S.A.) Types and consequences of forgetting: Intended and unintended
10:20 - 11:20	Speaker 8	**Fergus I. M. Craik** (Rotman Research Institute of Baycrest Centre for Geriatric Care, Canada) Age- related changes in human memory: Practical consequences
11:20 - 12:40	Lunch	
12:40 - 13:40	Speaker 9	**Dietrich Albert** (University of Graz, Austria and Hiroshima University, Japan) Memory, knowledge and e- learning
13:40 - 14:40	Speaker 10	**Robert A. Bjork** (University of California, Los Angeles, U.S.A.) Optimizing treatment and training: Implications of a new theory of disuse
14:40 - 15:00	Refreshments and poster session preparation	
15:00 - 16:15	Poster session (odd numbers)	

16:15 - 17:30	Poster session (even numbers)
17:30 - 19:00	Tea party (18:00　18:30 Entertainment)

3rd Tsukuba International Conference on Memory

Sunday March 10

Chairpersons:
Hiroshi Toyota   (Nara University of Education, Japan)
Takafumi Terasawa   (Okayama University, Japan)

Time		
09:10 - 10:00	Speaker 11	**Masaru Mimura** (Show University, Japan) Executive functions and prognosis of patients with memory disorders
10:00 - 11:00	Speaker 12	**Barbara Wilson** (MRC-CBU, Cambridge and The Oliver Zangwill Center, Ely, U.K.) Rehabilitation of memory for everyday life
11:00 - 11:10	Refreshments	
11:10 - 12:10	Speaker 13	**Ingvar Lundberg** (Göteborg University, Sweden) Working memory and reading disability
12:10 - 13:30	Lunch	
13:30 - 14:30	Speaker 14	**Robert Logie** (University of Aberdeen, U.K.) Working with memory in everyday cognition
14:30 - 15:00	Closing	**Lars-Göran Nilsson** (Stockholm University, Sweden)

Accuracy of Reports of Memory Failures and of Their Causes

Douglas Herrmann

    (Indiana State University, U.S.A)

Michael M Gruneberg

    (University of Wales at Swansea, U.K.)

Steve Fiore

    (University of Pittsburgh, U.S.A)

Jonathan Schooler

    (L.R.D.C. and University of Pittsburgh, U.S.A)

Tania Torres

    (Indiana State University, U.S.A)

Memory failures happen to everyone. Sometimes we are called on to provide an explanation of the causes of these memory failures. For example, a person who forgets to pick up a much needed gallon of milk will be asked by a spouse or significant other why this failure occurred. The purpose of this paper is to examine the accuracy of the memory failures and their causes.

If it were shown that the memory failure report is not accurate, then the causes cannot be accurate as well because the causes would be based on fallacious data. On the other hand, an accurate recall of a memory failure at its causes does not guarantee an accurate report of the causes of the failure. Inaccurate recall of causes for accurately recalled memory failures may occur because people might have difficulty in making judgments about their cognitive processes. If both memory failures and the causes reported by people were shown to be accurate, then investigations into the nature of these reports would be useful to guide future research about memory in everyday life.

This paper presents the findings of several investigations into the accuracy of the recall of memory failures and of the causes of such failures. These findings indicate that the both reports of memory failures and of causes are accurate but that the reports of the memory failures appear to be more accurate than the reports of causes.

Speaker 2: Kathy Pezdek

Friday March 8, 11:20 - 12:20

Memory for the Terrorists' Attack on New York, 9/11/01

Kathy Pezdek

(Claremont Graduate University, U.S.A.)

Most Americans will never forget the horrific events of September 11, 2001, however, few will remember the events as clearly as they think they will. Cognitive psychologists have extensively studied memory for traumatic events and eyewitness memory more specifically. The events of 9/11 offered an unprecedented opportunity to study memory for a traumatic event that had a significant and immediate effect on all Americans. Seven weeks after 9/11, we had five samples complete a questionnaire on (a) memory for the events of 9/11 and (b) their autobiographical memory for 9/11. These five samples were (a) 277 college students from Manhattan, New York, (b) 167 college students from California, (c) 127 college students from Hawaii, (d) 53 fire fighters from California, and (e) 68 United and American Airlines flight attendants and pilots. In the first wave of this longitudinal study, the primary comparisons are across the three college samples who, because of differences in time zones, first heard of the terrorists' attack on average, one hour, 2.50 hours, or 4.10 hours after the first World Trade Center tower had been struck. It was predicted that people would remember the events quite differently as a function of how the events were perceived. Because it took some time to realize that the events of 9/11 constituted a coordinated terrorists' attack, comparisons across time zones avail a test of this prediction. By seven weeks after 9/11, already memory for the events had been telescoped in time. In answer to the question, "How much time passed between when the first tower was struck to when it collapsed?" the mean estimate was 62 minutes, with no differences among the five samples; the correct answer was 108 minutes. In general, the Manhattan students and the flight attendants and pilots reported the highest levels of distress and their accounts were most accurate.

Response conformity formation in face recognition memory

Yukio Itsukushima
(Nihon University, Japan)

Research suggests that the presence of one witness influences others. The present study examined the effect of conformity to another response in face recognition memory test. During the experiment, a target person, never seen by the subjects, came to the classroom and asked the subjects to answer a questionnaire, which was not concerned with this study. About four months later, the subjects were asked to rate the similarity between the face of target and the set of other's faces. In the experimental conditions subjects participated in pairs. However, only one was a real subject and another was a confederate of experimenters pretending to be a subject. The two were asked to report aloud a judged similarity between a face that was sequentially displayed by a slide projector and the target's face that was not displayed but remembered from memory. The set of faces displayed did not include the face of target. An experimenter always asked a confederate to respond first and then asked a real subject. The responses of confederates were under full experimental control. In control condition subjects were just asked to rate the similarity between the remembered target's face and a set of face displayed. One week later, all the subjects were again asked to rate similarities between the remembered target's face and a new set of smiling faces, consisting of the persons who were in the prior similarity rating task, new persons, and the target. The results showed that in the experimental condition the subjects showed strong conformity to the responses of another person, and the effect of conformity remained one week after the first rating task. In the second experiment the similarity values given by a confederate were changed to test the generality of the effect. The result again showed a strong conformity effect.

Speaker 4: Jonathan Schooler
Friday March 8, 14:30 - 15:30

Discovering memories in the light of meta-awareness

Jonathan Schooler

(University of Pittsburgh, U.S.A.)

Discovered memories of abuse are often viewed with marked skepticism due to the relative dearth of well-corroborated evidence for their occurrence and the absence of a compelling theory to explain them. This talk addresses these concerns by reviewing seven recovered (or, as will be explained, what I prefer to term "discovered") memory cases in which there was independent corroborative evidence for the alleged abuse. These cases are considered within the context of a theory of meta-awareness that assumes that experiential consciousness (i.e., the contents of phenomenological experience) can be distinct from meta-awareness (i.e., one's consciousness of their consciousness). In this context, discovered memories can be understood as involving changes in individuals' meta-awareness of the abuse. In some cases, discovered memories may involve *the gaining of a different meta-awareness* of the meaning of an experience. The discovery of this new meaning may become confused with the discovery of the memory itself, leading to the (sometimes erroneous) belief that the memory is just now being accessed for the first time. In other cases, the discovery may involve *the regaining of a prior meta-awareness* of the experience that either deliberately or non-deliberately may have been avoided for some time. In still other cases, the discovery may actually involve *the gaining of a previously non-existent meta-awareness* of the experience. A variety of factors ranging from the very straightforward (e.g., age, lack of discussion, stress) to the more esoteric (e.g., dissociation, nocturnal cognitive processing) may prevent incidents of abuse from being initially encoded with meta-awareness. Such non-reflected memories, particularly when they are aschematic and disjunctive with other experiences, may continue to elude meta-awareness until a specific (and potentially obscure) contextual retrieval cue is encountered. Once recalled in the alarming light of meta-awareness, individuals may understand what happened to them, and this discovery may fundamentally change their view of their personal histories.

Speaker 5: Martin Conway

The Self-Memory System:
Autobiographical Memory & Identity

Martin Conway

(University of Durham, U.K.)

The Self-Memory System (SMS) consists of the autobiographical knowledge base and the working self. Specific autobiographical memories are transitory mental constructions created by the SMS. The working self maintains a complex pattern of accessibility to autobiographical knowledge, one feature of which is raised accessibility to highly goal-relevant autobiographical knowledge. Autobiographical knowledge constrains, in turn, what goals can be held by the working self and what sorts of self-images can be realistically maintained. This dynamic and complex memory system is distributed over networks that topographically are widely dispersed through cortical and limbic regions. Indeed, a particular pattern of brain activation encompassing anterior and posterior networks has been detected, and this may be the neurophysiological 'signature' of autobiographical memory formation. Finally, the SMS plays a critical role in individual, generational, and cultural identity, and this is reflected in the raised accessibility of memories from certain periods of life. New data illustrating this function of the SMS are reported

Speaker 6: D. Stephen Lindsay

Friday March 8, 16:50 - 17:50

Adults' Recollections of Long-past Events

D. Stephen Lindsay

(University of Victoria, Canada)

My lecture will review several interrelated lines of research my co-workers and I have conducted to explore adults' recollections of long-past events. One line of studies assessed adults' memories of events described in their own personal diaries, written years or decades earlier. Participants read parts of their old diaries and reported on various kinds of memory experiences that arose while doing so. The most striking aspect of the findings is that people very often reported that they had no memories of seemingly memorable events described in their own diaries. Another line of studies used questionnaires in which adults were asked about various childhood events (e.g, being bitten by a dog, winning a prize). For each event, respondents were asked whether or not they had experienced that event during childhood and, if so, whether or not they could recollect anything about the experience (as opposed to just knowing or believing that they had the experience). Respondents also rated the emotion of each event, from " very negative" to " very positive." Respondents quite often reported no memories of reportedly experienced events, and such no-memory reports were more common for events rated as negative than for those rated as positive. Interestingly, the rate of recollecting reportedly experienced events changed little with age. A third line of research used high-school year books and other archival materials to assess adults' recollections of high school. In general, participants remembered relatively few of the items on the test; interestingly, accuracy did not decline significantly with age, but confidence did decline with age. The fourth and final line of research to be summarized in my lecture uses photographs of childhood events in the context of suggestive procedures to create false memories of pseudoevents. Taken together, this research indicates that memory for long-past events is typically very incomplete and subject to distortion.

Types and consequences of forgetting:
Intended and unintended

Elizabeth L. Bjork

   (University of California, Los Angeles, U.S.A.)

Robert A. Bjork

   (University of California, Los Angeles, U.S.A.)

Malcolm D. MacLeod

   (University of St. Andrews, U.K.)

For most of us, " forgetting things" is the biggest complaint we have about our memories. Forgetting, however, is a necessary and critical component of any efficient and adaptive memory system and, often, exactly what we need to do to keep our memories functioning optimally in a changing world. We need some means to set aside, suppress, or erase old information, such as a phone number that is no longer functional, or a password that is out of date. Without some such forgetting mechanism, we would soon become either incapable of retrieving the information we now need, or very slow to do so owing to the need to invoke decision processes to disentangle information that is current from information that is out of date.

In certain cases, the types of forgetting that serve our broader purposes are intentional, or at least not unintentional, as when we try to avoid retrieving uncomfortable memories, or try to learn a new phone number or password. In many other cases, however, forgetting is unintended and often not consistent with our current goals. Our primary focus in this paper is on one such type of forgetting, *retrieval-induced forgetting* (Anderson, Bjork, & Bjork, 1994), in which retrieving some of the items associated to a particular cue or configuration of cues results in subsequent impaired access to (i.e., forgetting of) other items associated to that cue or those cues. We argue that retrieval-induced forgetting is prevalent in our lives and that it plays a significant role not only in the updating of our memories, but also and sometimes unintended in stereotyping and other forms of impression formation, in the reliability of witness memory, and possibly in repression.

Speaker 8: Fergus I. M. Craik

Saturday March 9, 10:20 - 11:20

Age-related changes in human memory:
Practical consequences

Fergus I. M. Craik

(The Rotman Research Institute of Baycrest Centre for Geriatric Care, Canada)

My research on aging is largely theoretical and experimental, but in this paper I will attempt to show how the results of laboratory studies of memory and aging have implications for human factors, design of housing for the elderly, and methods of rehabilitation. I will first present an overview of what is known about age-related changes in memory performance. Some functions decline very little with age whereas others decline substantially, so clearly a theoretical framework is needed to provide an adequate account of these different patterns. My own preferred framework is in terms of processes rather than structures; in my view older adults are less able to carry out self-initiated processing operations (perhaps mediated by a decline in frontal lobe functioning), so performance suffers unless the appropriate processes are bolstered by environmental support.

I will then describe some recent studies from my laboratory that illustrate aspects of the theoretical framework, and also point out the relevance of the findings for practical issues. The themes covered will include the effects of divided attention on encoding and retrieval processes. Older adults show greater performance losses on the secondary task, especially during retrieval. Division of attention in young adults is one manipulation that results in levels of memory performance that resemble those of older adults; other ways of " mimicking aging" include speeded performance and hearing in noisy conditions. Finally, some experiments will be described in which the memory performance of older adults is improved by various manipulations. The implications of the results for methods of memory rehabilitation in normal aging will be discussed.

Memory, Knowledge, and E-Learning

Dietrich Albert

(University of Graz, Austria, and Hiroshima University, Japan)

The aims of my contribution are to stimulate research in the psychology of memory and that of knowledge, as well as stimulating the future development of e-learning systems.   Starting with a variety of existing e-learning systems, I focus on two examples (ALEKS and RATH), and their theoretical background which is Knowledge Space Theory (e.g. Doignon and Falmagne, 1999; Albert and Lukas, 1999).   Within this theoretical framework the models and results of memory psychology (e.g. Albert & Stapf , 1996; Bjork & Bjork, 1996; Herrmann, 1996; Neath, 1998; Tulving & Craik, 2000) can be used for specifying the knowledge models and improving the e-learning systems substantially.   For instance, by implementing multi attribute fluctuation models, learning and relearning may be guided for optimising fast learning as well as long retention.   On the other hand, research on memory can profit from the methodology in knowledge- and e-learning-research: Knowledge Space Theory provides tools which can be used for validating models of memory empirically by taking answer pattern and individual differences into account. Web-based e-learning technology provides methods of data collection under fairly controlled conditions.   Thus, the first time in the history of memory psychology it's models can be verified by controlled quasi experiments in an ecological setting.   Finally, directions of future developments of research and development in memory, knowledge and e-learning are discussed.

References and Resources

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Speaker 10: Robert A. Bjork

Saturday March 9, 13:40 - 14:40

Optimizing treatment and training:
Implications of a new theory of disuse

Robert A. Bjork

   (University of California, Los Angeles, U.S.A.)

Elizabeth L. Bjork

   (University of California, Los Angeles, U.S.A.)

Treatment and training have a central goal in common optimizing the long-term retention and transfer of the new learning that is the target of therapy or training. A variety of basic-research findings suggest, however, that optimizing such retention and transfer may require structuring the conditions of therapy or training in some unintuitive and nonstandard ways. Conditions that may appear optimal, as measured by desirable changes observed *during* treatment, or by rapid improvements in performance *during* training, may prove far from optimal as measured by the actual carryover of those effects to real-word environments. Conversely, conditions that introduce certain difficulties, often slowing the apparent rate of progress and learning, may enhance long-term retention and transfer of desired changes or knowledge.

In this paper we discuss the implications of a particular theoretical framework one we have labeled the *new theory of disuse* (Bjork & Bjork, 1992) for how treatment and training should be structured. The theory distinguishes between *storage strength*, a measure of learning, and *retrieval strength*, a measure of current ease of access a distinction that is consistent with the time-honored distinction between *learning* and *performance*. From the standpoint of the theory, programs of treatment and training are frequently far from optimal for two reasons: (a) Retrieval strength is confused with learning; and (b) manipulations that according to the theory optimize the gain of retrieval strength are *not* those that will optimize the gain of storage strength and, hence, support long-term retention and transfer.

Executive functions and prognosis of patients with memory disorders

Masaru Mimura

(Showa University, Japan)

In the context of memory and social functioning, three studies on prognosis of alcohol related problems were conducted, focusing on different aspects of memory and executive function.

[Study 1] This investigated what neuropsychological tests predict alcoholic patients' future outcome. We administered seven neuropsychological tests to 22 chronic alcoholics after 7 weeks of detoxification. Included in the tests were tasks for attention and working memory as well as a battery of tests called the Behavioral Assessment of the Dysexecutive Syndrome (BADS). Two functional outcome indices, i.e., resumption of drinking and occupation were evaluated 18 months after discharge. Alcoholics' performance on BADS predicted alcohol-nonspecific outcome (occupation) but not alcohol-specific (drinking) outcome. In contrast, other neuropsychological tests did not predict any of the two outcome indices. The results suggest that ecologically valid neuropsychological tests such as BADS are the better predictors of alcoholics' social outcome.

[Study 2] Long-term social outcome of 26 alcoholic Korsakoff amnesics was evaluated at 81.9 months after onset. Initial neuropsychological examination performend at 14.3 months after onset disclosed dense amnesia in contrast to normal intelligence and attention. The patients were also impaired in the Wisconsin Card Sorting Test (WCST). At approximate 7 years follow-up, three patients were dead and 11 patients were still institutionalized. Only three patients returned to work. The results suggest that Korsakoff amnesics have poorer social outcome than amnesics caused by other etiologies such as head injuries and encephalitis.

[Study 3] Among 26 Korsakoff patients in Study 2, eight received longitudinal neuropsychological assessment at two points (18.5 months and 84.3 months). Dense amnesia together with preserved intelligence and attention showed no interval change throughout assessments. In contrast, frontal executive impairment as indexed by WCST performance showed slight but steady improvement at follow-up. However, memory compensation including external aids and mnemonic strategies were only infrequently used even at follow-up7. Patients with severe executive dysfunction administered less compensation.

These three studies may suggest that executive dysfunctions play a crucial role in the prognosis of alcoholic amnesic patients.

Speaker 12: Barbara Wilson

Sunday March 10, 10:00 - 11:00

Rehabilitation of memory for everyday life

Barbara Wilson

(MRC-CBU, Cambridge and The Oliver Zangwill Centre, Ely, U.K.)

The main goal of rehabilitation is to enable people disabled by injury or disease to return to their own, most appropriate environment. Memory rehabilitation should also follow this principle and focus on real life problems rather than experimental material. Although people with memory impairments and their families should not be led to believe that significant improvement in memory can occur once the period of natural recovery is over, they can, nevertheless, be helped to manage, cope with or bypass problems arising from such impairment. When planning for a memory therapy programme, results from a neuropsychological assessment should be combined with more direct assessment of everyday problems obtained by observation, interviewing and self report measures. Neuropsychological assessment will identify cognitive strengths and weaknesses while direct assessment will highlight everyday problems requiring treatment. Some general guidelines exist to improve learning and retention in people with memory problems but, in addition to these guidelines, we need to identify specific goals appropriate for individual patients and families. Achieving these goals may require environmental adaptations, teaching the use of external memory aids, helping people to use strategies to enhance learning and dealing with the emotional and psychosocial consequences of memory impairment. In addition to individual therapy, group treatments have certain advantages. They are useful in reducing anxiety and depression, in increasing social contacts, and in practising the use of aids and strategies. The teaching of generalisation from one setting to another or from one problem to another should be an integral part of a memory rehabilitation programme. This talk presents data to support these views and concludes with a case example of a successful memory programme for a man who sustained a severe head injury.

Working memory and reading disability

Ingvar Lundberg

(Göteborg University, Sweden)

As a cognitive tool the art of reading and writing has had a most profound impact on society and human cognitive functioning. Written language has the character of an external memory system where its spatial lay-out and its permanence permit inspection and repeated controls of the stream of thoughts, thereby considerably reducing the working load of the human memory. As all revolutionary inventions, however, written language has also had non-intended side effects. "Those who acquire it will cease to exercise their memory and become forgetful; they will rely on writing to bring things to their remembrance by external signs instead of on their own internal resources", as the skeptical Egyptian king Thamus put it in Plato's dialogue Phaedrus. And no doubt, nonliterate peoples are capable of astonishing feats of memory testified by ethnologists.

Although the art of verbatim long-term episodic memorization might have declined in literate societies, reading and writing seem to have put other demands on the memory system. In processing written text a reader must integrate moment-to-moment perceptions across time, rehearse them and combine them with simultaneous access to archival information about past experience, actions and knowledge. This is what working memory involves. In oral dialogues the working-memory load is normally considerably lower than in reading, as written discourse packs linguistic information differently. The absence of prosodic information further increases the working-memory load in reading. This point will be further elaborated in the paper. Even at the word level, especially in alphabetic scripts, and especially during the initial stages of reading acquisition, the decoding process involves considerable working-memory demands. A skilled reader processes many thousands of words each day, year after year. No doubt, this intense and extensive activity would be expected to have a profound impact on brain functions. And, in fact, recent studies have shown how literate adults have brain activity patterns as response to phonological memory tasks which are clearly different from the patterns of illiterate individuals from the same SES background (Ingvar, 1999). Also dyslexic individuals show lower activity or less integrated activity in brain areas of critical importance for phonological processing (Paulesu et al., 1998; Pugh et al. 1999).

A complex working-memory task is typically devised to mimic the competing cognitive demands involved in an activity such as reading. In the study to reported in this paper the subject is orally presented with a consonant letter followed by a simple sentence verification task also orally presented ("trees can walk" yes-no). After two or more such presentations the subject is required to report the presented consonants in correct order. This is a task involving the phonological loop as well as the central executive (Baddeley & Gathercole, 1996).

This task and several other tasks were presented to 30 adults with a proven history of reading disability and to 30 normal readers matched on age, gender and educational level. The working memory capacity was significantly associated with a number of phonological tasks such as spoonerism, non-word reading, and phonological distinctness of vocabulary. Logistic regressions, however, demonstrated that working memory had the power of predicting group

belonging over and above the other tasks. This finding supports the assumption of the critical role of complex working memory in reading. However, the causal direction is still an unsettled issue.

Speaker 14: Robert Logie
Sunday March 10, 13:30 - 14:30

Working with memory in everyday cognition

Robert Logie

(University of Aberdeen, U. K.)

Working memory refers to the capacity for retaining information on a temporary basis, and for manipulating, transforming, and reinterpreting that information during the performance of a wide range of everyday tasks. The multiple component model of working memory has been particularly successful in accounting for many aspects of everyday cognition from immediate verbal and visual memory tasks, through acquisition of vocabulary to mental arithmetic, reasoning and creative thinking. It provides not only an understanding of healthy adult cognition, but also offers insight into the cognitive impairments that arise from some forms of focal brain damage, as well as from brain diseases such as Alzheimer's disease. This paper will provide a broad overview of some of these applications of working memory research, and will then report the results of two lines of experimental research that illustrate how the multiple task working memory model has been particularly fruitful in the study of (a) mental imagery in healthy adults and in brain damaged individuals and (b) dual task performance impairments that arise in the early stages of Alzheimer's disease. Results offer insight into (i) some of the processes of mental discovery and creative thinking, (ii) the possibility that perception and mental imagery are rather more distinct than has been assumed hitherto (iii) some of the cognitive difficulties that brain damaged individuals might encounter in daily life with advice for carers, (iv) non-invasive methods for detecting and monitoring the impact of some forms of brain damage, (v) further theoretical development in the area of on-line cognition.